UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/802,165	03/08/2001	Byung-Jin Chun	678-623 (P9782)	6181

7590 01/30/2004

Paul J. Farrell, Esq.
Dilworth & Barrese, LLP
333 Earle Ovington Blvd.
Uniondale, NY 11553

EXAMINER	
IQBAL, KHAWAR	
ART UNIT	**PAPER NUMBER**
2686	6

DATE MAILED: 01/30/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	09/802,165	CHUN ET AL.
	Examiner	**Art Unit**
	Khawar Iqbal	2686

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE _03_ MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☐ Claim(s) _____ is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) _1-43_ is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. §§ 119 and 120

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☒ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

13)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application) since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

a) ☐ The translation of the foreign language provisional application has been received.

14)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121 since a specific reference was included in the first sentence of the specification or in an Application Data Sheet. 37 CFR 1.78.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1-3,6-24,33,36-43 are rejected under 35 U.S.C. 102(e) as being unpatentable by Kuwahara et al (6597679).

3. Regarding claim 1 Kuwahara et al teaches a base station device in a mobile station where a mobile station receives forward information signals in a plurality of paths according to a communication environment with respect to a forward information signal transmitted from an antenna array having a plurality of antennas in a base station, extracts forward fading information signals for the plurality of paths from the forward information signals, and transmits a reverse signal including the forward fading information signals to the base station, the base station device comprising (col. 2, lines 1-41):

a receiver for receiving the reverse signal through the antenna array (col. 3, lines 66-67);

a beam formation controller for generating weight vectors to be assigned to the antennas of the antenna array based on forward fading powers and array vectors

indicating direction of a forward signal estimated from the received reverse signal for the plurality of paths, so that the intensity of a transmission beam pattern steered from the antennas in a direction to the mobile station is large (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, lines 24-50); and

a transmission beam generator for applying the weight vectors to the antennas (col.9, lines 1-8, col. 2, lines 30-41, col. 8, line 40-col. 9, line 11).

Regarding claim 2 Kuwahara et al teaches a reverse processor for processing the reverse signal received through the antenna array, and a forward fading information extraction unit for extracting forward fading information from the received reverse signal (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, lines 24-50).

Regarding claim 3 Kuwahara et al teaches a forward fading power calculator for calculating a forward fading power for each path based on the extracted forward fading information; an array vector calculator for calculating an array vector for each path from the reverse signal; a transmission correlation matrix calculator for calculating a transmission correlation matrix using the forward fading powers and the array vectors; and a weight vector calculator for calculating a weight vector from the transmission correlation matrix, updating an existing weight vector with the calculated weight vector, and outputting the updated weight vector as a control signal to the transmission beam generator (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, lines 24-50).

Regarding claim 6 Kuwahara et al teaches a base station device having an antenna array, for receiving forward fading information from a mobile station in a mobile communication system, comprising (col. 2, lines 1-41):

a reverse processor for processing a reverse signal received through the antenna array (col.3, lines 33-40);

a forward fading information extraction unit for extracting forward fading information from the received reverse signal (col.3, lines 40-65);

a beam formation controller for generating a weight vector for formation of a transmission beam using the forward fading information and the received reverse signal (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, lines 24-50); and a forward processor having a transmission beam generator for generating a transmission beam for a transmission message based on the weight vector (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, lines 24-50).

Regarding claim 7 Kuwahara et al teaches a forward fading decoder for decoding forward fading information for each path fed back from a mobile station from the received reverse signal of the reverse processor; and a forward fading extractor for extracting a forward fading coefficient from the decoded forward fading information (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, lines 24-50).

Regarding claims 8 and 9 Kuwahara et al teaches wherein if the decoded forward fading information is represented as complex information the forward fading

extractor extracts a complex forward fading coefficient using a weight vector w and an estimated array vector used for formation of the transmission beam (col.3, lines 52-65, col. 5, lines 5-25).

Regarding claim 10 Kuwahara et al teaches wherein the forward fading information extraction unit further comprises a memory for storing a predetermined number of previous forward fading coefficients (col. 2, lines 15-25, col. 9, lines 42-55).

Regarding claim 11 Kuwahara et al teaches a forward fading power calculator for calculating forward padding power for each path based on the extracted forward fading information; an array vector calculator for calculating an array vector for each path from the received reverse signal; a transmission correlation matrix calculator for calculating a transmission correlation matrix based on the forward fading powers and the array vectors; and a weight vector calculator for calculating a weight vector from the transmission correlation matrix, updating the previous weight vector with the calculated weight vector, and outputting the updated weight vector as a control signal to the transmission beam generator(col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, lines 24-50).

Regarding claim 12 Kuwahara et al teaches wherein the forward fading power calculator comprises an average reverse fading power calculator for calculating an average reverse fading power for each path from the reverse signal and a Doppler frequency estimator for estimating a mobility of the mobile station, for calculating the forward fading power using the forward fading information, the reverse fading power, and the Doppler frequency according to a feedback delay time and a

movement speed of the mobile station (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, lines 24-50).

Regarding claim 13 Kuwahara et al teaches wherein the forward fading power calculator receives the extracted forward fading coefficient for each path and outputs forward fading power for each path if a variation of the feedback time delay is small (col. 4, lines 1-24, col. 8, lines 15-40, see above).

Regarding claims 14-18 Kuwahara et al teaches wherein the forward fading power calculator calculates a current forward fading coefficient for each path by a predetermined prediction method using the plurality of previous forward fading coefficients for each path, an average reverse fading power for each path, and the Doppler frequency for each path if a variation of the feedback time delay is great (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, line 9-col. 9, line 55).

Regarding claims 19-24 Kuwahara et al teaches wherein the forward fading power calculator further comprises: a mobility estimator for estimating the mobility of the mobile station; and a selector for receiving the average reverse fading power for each path from the average reverse fading power calculator and the forward fading power for each path and selecting the forward fading power if the mobility is lower than a predetermined threshold and the average reverse fading power if the mobility is greater than the threshold (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, line 9-col. 9, line 55).

As to claim 33 it is considered the claim is rejected for the same reason as set forth in claim1.

As to claim 36 it is considered the claim is rejected for the same reason as set forth in claim 6.

As to claim 40 it is considered the claim is rejected for the same reason as set forth in claim 1.

Regarding claims 37 and 41 Kuwahara et al teaches a base station device that has an antenna array and received forward fading information from a mobile station in a mobile communication system, comprising (col. 2, lines 1-40):

a reverse processor for processing a reverse signal received through the antenna array (col. 3, lines 66-67);

a forward fading information extraction unit for extracting forward fading information from the received reverse signal (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, lines 24-50);

a forward fading power calculator for calculating an average reverse fading power and a Doppler frequency from the received reverse signal and calculating a current forward fading power for each path by a predetermined prediction method based on a plurality of previous forward fading coefficients for each path, the average reverse fading power, and the Doppler frequency (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, lines 24-50);

an array vector calculator for calculating an array vector for each path from the reverse signal (col.3, lines 41-65, col. 8, lines 24-50, see above);

a transmission correlation matrix calculator for calculating a transmission correlation matrix using the forward fading powers and the array vectors (col.4, lines 30-65, see above);

a weight vector calculator for calculating a weight vector from the transmission correlation matrix, updating an existing weight vector with the calculated weight vector, and outputting the updated weight vector as a control signal to a transmission beam generator, and a forward processor comprising the transmission beam generator for generating a transmission beam for a transmission message based on the weight vector (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, lines 24-50).

Regarding claims 38,39,42-43 Kuwahara et al teaches a base station device that has an antenna array and received forward fading information from a mobile station in a mobile communication system, comprising (col. 2, lines 1-40):

a reverse processor for processing a reverse signal received through the antenna array (col. 3, lines 66-67);

a forward fading information extraction unit for extracting forward fading information from the received reverse signal (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, lines 24-50);

a forward fading power calculator for calculating forward fading power for each path based on the extracted forward fading information, calculating an average reverse fading power from the reverse signal, and selecting the forward fading power if the mobility of the mobile station is lower than a predetermined threshold and the average

reverse fading power if the mobility of the mobile station is greater than the threshold (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, line 9-col. 9, line 55);

an array vector calculator for calculating an array vector for each path from the reverse signal (col. 3, lines 41-65, col. 8, lines 24-50, see above);

a transmission correlation matrix calculator for calculating a transmission correlation matrix using the forward fading powers and the array vectors (col.8, lines 5-40);

a weight vector calculator for calculating a weight vector from the transmission correlation matrix, updating an existing weight vector with the calculated weight vector, and outputting the updated weight vector as a control signal to a transmission beam generator (col. 2, lines 1-41, col. 4, lines 5-67, col. 5, lines 48-62, col. 6, lines 14-26, col. 8, lines 24-50); and

a forward processor comprising the transmission beam generator for generating a transmission beam for a transmission message based on the weight vector (col.8, line 40-col. 9, line 11, see above).

4. Claims 4,5,25,30-32,34-35 are rejected under 35 U.S.C. 102(e) as being unpatentable by Raleigh et al (20030072382).

5. Regarding claim 4 Raleigh et al teaches a mobile station device for receiving a forward information signal in a plurality of paths according to a communication environment from an antenna array having a plurality of antennas in a base station, comprising (figs.1-10):

a receiver for receiving forward information signals from the plurality of paths with respect to the forward information signal transmitted from the base station (para. # 0084-0086);

a forward processor for extracting forward fading power information signals for the plurality of paths from the received forward information signals (para. # 0084-0086); and

a transmitter for multiplexing a transmission message signal with the forward fading power information signals received from the forward processor (para. # 0084-0086, 0170-0172).

Regarding claim 5 Raleigh et al teaches a forward fading estimator for estimating forward fading information for each path from which the forward information signals are received; and a forward fading encoder for combining the forward fading information for the plurality of paths and encoding the combined forward fading information (para. # 0084-0086, 0170-0172).

Regarding claims 25,30,31 Raleigh et al teaches a mobile station device in a mobile communication system, comprising:

a forward processor for processing a received forward signal (para. # 0084-0086);

a forward fading estimator for estimating forward fading information of the forward signal for each path (para. # 0084-0086);

a forwarding fading encoder for combining the estimated forward fading information and encoding the combined forward fading information (para. # 0084-0086, 0170-0172); and

a reverse processor for multiplexing the encoded forward fading information with a transmission message and feeding back the forward fading information in the multiplexed signal to a base station (para. # 0084-0086, 0170-0172).

As to claim 34 it is considered the claim is rejected for the same reason as set forth in claim 4.

Regarding claim 32 and 35 Raleigh et al teaches a mobile communication system comprising:

a base station device having a reverse processor for processing a reverse signal received through an antenna array, a forward fading information extraction unit for extracting forward fading information from the received reverse signal, a beam formation controller for generating a weight vector for formation of a transmission beam using the forward fading information and the received reverse signal, and a forward processor having a transmission beam generator for generating a transmission beam for a transmission message based on the weight vector (para. # 0068-0076); and

a mobile station device having a forward processor for processing a received forward signal, a forward fading estimator for estimating forward fading information of the forward signal for each path, a forwarding fading encoder for combining the estimated forward fading information and encoding the combined forward fading information, and a reverse processor for multiplexing the encoded forward fading

information with a transmission message and feeding back the forward fading information in the multiplexed signal to a base station (para. # 0084-0086, 0170-0172).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

7. Claims 26-29 are rejected under 35 U.S.C. 103(a) as being unpatentable over Raleigh et al (20030072382) as and further in view of Raleigh et al (6101399).

8. Regarding claim 26-29 Raleigh et al (20030072382) teaches the communication method involves determining from channel information a number of independent spatial channels The channel information relates the spatial channel coupling of an array of antenna elements at the base station to that of an array of elements at the subscriber unit. Several information signals are encoded into a sequence of transmitted signal vectors. These vectors have pref. complex valued components and are selected to send distinct information signals over the independent spatial channels. The vectors are transmitted from the base station array and received at the array at the subscriber unit. The received signal vectors are decoded to recover the information signals (para. # 0008-0011). Raleigh et al (20030072382) does not specifically teach omnidirectional beam. Raleigh et al (6101399) a communications system has a central communications station and at least one remote communications station, and the central station has an array antenna for generating an antenna beam pattern for the transmission of

information signals received by the remote station. The method for adaptively controlling the beam pattern involves statistically characterising a receive vector channel which represents a receive communications channel over which the signal energy is transferred form the remote unit to the central or base station. A beam pattern weight vector is generated based on the results of the statistical characterisation of the receive channel vector and in accordance with a predetermined quality measurement of the signals received by the remote unit. A beam pattern is formed using the beam pattern weight vector (col. 7, line 45-col. 8, line 50). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the device of Raleigh et al (20030072382) by specifically adding feature E1 link to support the omnidirectional beam in order to enhance system performance of the system purpose of increasing efficiency telecommunication system as taught by Raleigh et al (6101399).

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to KHAWAR IQBAL whose telephone number is 703-306-3015.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, **BANKS-HAROLD, MARSHA**, can be reached at 703-305-4379.

Any response to this action should be mailed to:

Commissioner of Patents and Trademarks

Washington, D.C. 20231

or faxed to:

(703) 872-9314 (for Technology Center 2684 only)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA, Sixth Floor (Receptionist).

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Technology Center 2600 Customer Service Office whose telephone number is (703) 306-0377.

Khawar Iqbal

Marsha D Banks-Harold
MARSHA D. BANKS-HAROLD
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600